Synthesis and characterization of Bi3Mg2Nb3O14 pyrochlore system.

Abstract

Synthesis of Bi3Mg2Nb3O14 pyrochlore was carried out using conventional solid-state method. Phase formation and electrical properties of Bi3Mg2Nb3O14 pyrochlore were investigated by employment of different instruments. X-ray diffraction technique was applied to analyze the phase purity of the prepared Bi3Mg2Nb3O14 pyrochlore. The surface morphology of Bi3Mg2Nb3O14 pyrochlore was examined by scanning electron microscope. Electrical properties of this sample were studied using ac impedance analyzer, HP4192A in the frequency range of 5 Hz – 13 MHz. The "ideal" Bi3Mg2Nb3O14 formed at 1025°C as cubic pyrochlore with minute traces of secondary phase. The dielectric constant was ~110 at room temperature at 1 MHz. The sample showed negative temperature coefficient of relative permittivity, TCε' ~ -480 ppm/°C in the temperature range of 25 -300°C and low dielectric loss, tan δ, 10-3 at 1 MHz.

Keyword: Phase formation; Sintering; Pyrochlore; Solid state.